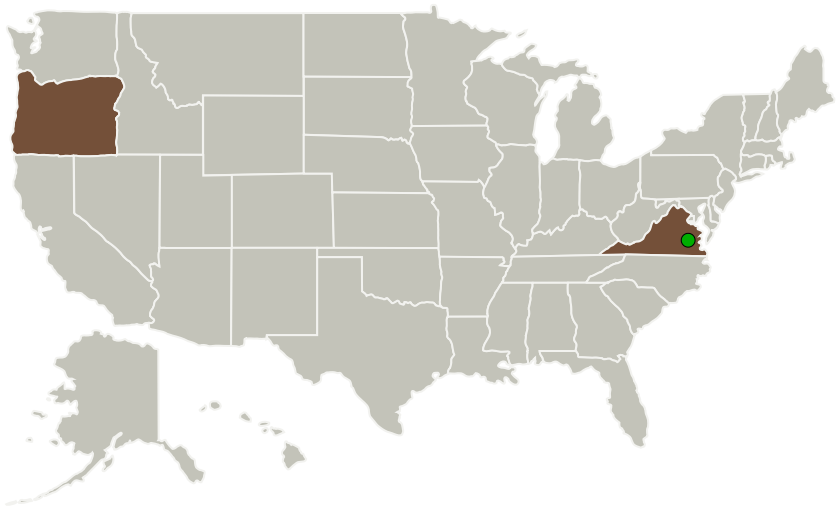
Convective Induced Turbulence (CIT) Detection via Total Lightning Sensing, Phase I

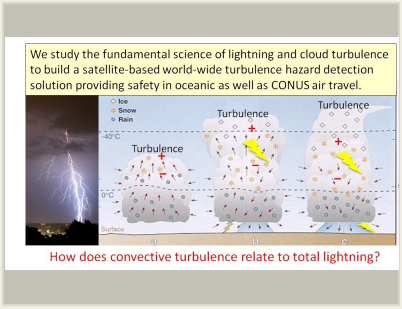
Completed Technology Project (2013 - 2013)

Project Introduction

We proposes to build a prototype Convective-Induced Turbulence (CIT) hazard detection system based on total lightning sensing as an indicator of the location and severity of in-cloud CIT. Total lightning is the combination of cloud-to-ground and in-cloud lightning and has been shown to correlate well with storm dynamics. Total lightning activity will be measured globally at high temporal resolution from total lightning detectors onboard future geostationary satellites such as the Geostationary Lightning Mapper (GLM) on the Geostationary Operational Environmental Satellite R-Series (GOES-R) and the Lightning Imager (LI) on the Meteosat third generation satellites. Thus, we seek to investigate the relationship between in-cloud convective turbulence and total lightning measurements, and determine the skill of total lightning as an indicator of in-cloud CIT. We investigate how to use proxies for GLM lightning data to enhance the diagnosis of hazardous turbulence over the Continental United States (CONUS) where verification data is readily available from ground-based (radar-based) systems. This system will enhance safety of flight for aircraft in the CONUS as well as oceanic and global airspace. Such a technology would be useful to all aircraft that fly, from General Aviation (GA) aircraft to Unmanned Air Systems (UASs) to business jets and commercial jets.

Primary U.S. Work Locations and Key Partners





Convective Induced Turbulence (CIT) Detection via Total Lightning Sensing

Table of Contents

Small Business Innovation Research/Small Business Tech Transfer

Convective Induced Turbulence (CIT) Detection via Total Lightning Sensing, Phase I

Completed Technology Project (2013 - 2013)

Organizations Performing Work	Role	Type	Location
The Innovation Laboratory, Inc.	Lead Organization	Industry Women-Owned Small Business (WOSB)	Portland, Oregon
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Oregon	Virginia

Project Transitions

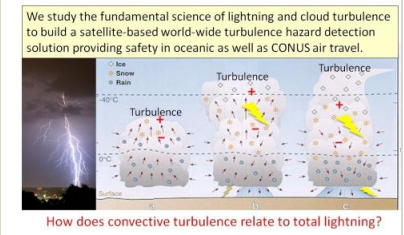
May 2013: Project Start

November 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138063)*

Images



Project Image
Convective Induced Turbulence (CIT) Detection via Total Lightning Sensing
(https://techport.nasa.gov/image/136436)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

The Innovation Laboratory, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

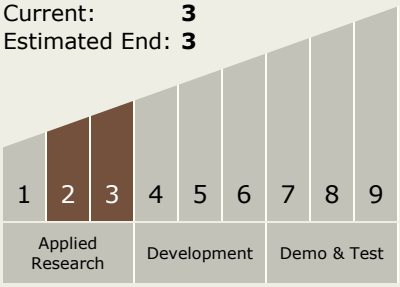
Carlos Torrez

Principal Investigator:

Jimmy Krozel

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Completed Technology Project (2013 - 2013)

Technology Areas

Primary:

- TX13 Ground, Test, and Surface Systems
  - TX13.1 Infrastructure Optimization
    - TX13.1.6 Test, Operations, and Systems Safety

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System